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Atty. Docket No. DP-308423

CERTIFICATE OF MAILING

I hereby certify that this paper, together with all enclosures identified herein, are being deposited with the United States Postal Service as first class mail, addressed to the Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on the date indicated below.

March 28, 2006
Date

Jacki R. Buckley

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Art Unit	:	3661
Examiner	:	Gertrude A. Jeanglaude
Appln. No.	:	10/722,706
Applicant	:	Peter J. Schubert
Filing Date	:	November 23, 2003
Confirmation No.	:	7484
For	:	VEHICLE ROLLOVER SENSING USING ANGULAR ACCELEROMETER

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION - 37 CFR §41.37)

1. Transmitted herewith is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on February 6, 2006.

2. **STATUS OF APPLICANTS**

This application is on behalf of:

_x_ other than a small entity.

___ a small entity.

A verified statement:

___ is attached.

___ was already filed.

3. **Fee for Filing Appeal Brief**

Pursuant to 35 USC §41(a)(6), the fee for filing the Appeal Brief is:

___	small entity	$250.00
_x_	other than a small entity	$500.00
	Appeal Brief fee due:	$500.00

4. **Extension of Term**

The proceedings herein are for a patent application and the provisions of 35 USC §41(a)(8) apply.

(complete (a) or (b), as applicable)

(a) ___ Applicant petitions for an extension of time under 37 CFR §1.136:

Extension (months)	Fee for other than small entity	Fee for small entity
___ one month	$120.00	$60.00
___ two months	$450.00	$225.00
___ three months	$1020.00	$510.00
___ four months	$1590.00	$795.00
___ five months	$2160.00	$1080.00
	FEE:	$

If an additional extension of time is required, please consider this a petition therefor.

(b) _x_ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. **Total Fee Due**

The total fee due is:

Appeal Brief fee:	$500.00
Extension fee (if any)	$
TOTAL FEE DUE:	$500.00

6. **FEE PAYMENT**

_x_ Attached is a check in the sum of $500.00.

___ Charge Account No. 16 2463 the sum of $______.
A duplicate of this transmittal is attached.

7. **FEE DEFICIENCY**

_x_ If any additional extension and/or fee is required, this is a request therefor and to charge Account No. 16 2463.

and/or

_x_ If any additional fee for claims is required, charge Account No. 16 2463.

Respectfully submitted,

March 28, 2006
Date

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APPEAL BRIEF (37 CFR §41.37)

This brief is in furtherance of the Notice of Appeal, filed in this case on February 6, 2006.

The fees required under 35 USC 41(a)(6), and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains these items under the following headings, and in the order set forth below (37 CFR §41.37(c)):

I. Real Party in Interest

II. Related Appeals and Interferences

III. Status of Claims

IV. Status of Amendments

V. Summary of Claimed Subject Matter

VI. Grounds of Rejection to Be Reviewed on Appeal

The final page of this brief bears the attorney's signature.

I. Real Party in Interest

The real party in interest in this application is Delphi Technologies, Inc., the assignment to which was recorded at Reel 014748, Frame 0480.

II. Related Appeals and Interferences

Appellants are aware of no appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

This is an appeal from a Final Rejection of claims 1-31. Claims 1-31 were originally presented and have not been amended. No claims currently stand allowed. Appealed claims 1-31 are attached in the appendix hereto.

IV. Status of Amendments

A Reply After Final was filed on January 4, 2006, in response to the Final Office Action mailed on November 4, 2005. An Advisory Action was mailed on January 20, 2006. In the Advisory Action, the Examiner indicated for purposes of Appeal, the proposed

amendment will not be entered. Applicant assumes the Examiner intended not to enter the Reply After Final of January 4, 2006, as no such amendments were presented.

V. Summary of Claimed Subject Matter

As described in the specification and illustrated in FIGS. 1-7 of Appellant's application for Letters Patent, the present invention recited in the finally rejected claims relates to a roll angle estimation apparatus, referred to in the specification as rollover sensing module 20, and method for predicting a future roll angle of a vehicle 10, and relates to a rollover sensing apparatus, also referred to as the rollover sensing module 20, and method for predicting an overturn condition of a vehicle 10. According to one aspect of the present invention, the roll angle estimation apparatus 20, recited in independent claim 1, predicts a future roll angle ϕ_t of the vehicle 10. The roll angle estimation apparatus 20 includes an angular accelerometer 22 for sensing angular acceleration of a vehicle 10 and producing an output signal $\ddot{\phi}$ indicative thereof (see FIGS. 2 and 3). The roll angle estimation apparatus 20 also includes an integrator 40 for integrating the sensed angular acceleration signal $\ddot{\phi}$ and producing an angular rate $\dot{\phi}$ (see FIG. 3). The roll angle estimation apparatus 20 further includes a predictor 44 for predicting a future roll angle ϕ_t of the vehicle 10 as a function of the sensed angular acceleration $\ddot{\phi}$, the angular rate $\dot{\phi}$ and the current roll angle ϕ (see FIGS. 2 and 5).

According to another aspect of the present invention, as recited in independent claim 10, a rollover sensing apparatus 20, is provided for predicting an overturn condition for a vehicle 10. The rollover sensing apparatus 20 includes an angular accelerometer 20 for sensing angular acceleration of a vehicle 10 and producing an output signal $\ddot{\phi}$ indicative thereof (see FIGS. 2 and 3). The rollover sensing apparatus 20 also includes an integrator for integrating the sensed angular acceleration signal $\ddot{\phi}$ and producing an angular rate $\dot{\phi}$ (see FIG. 3). The rollover sensing apparatus 20 has a predictor for predicting a future roll angle ϕ_t of the vehicle 10 as a function of the sensed angular acceleration $\ddot{\phi}$, the angular rate $\dot{\phi}$, and a current roll angle ϕ (see FIGS. 2 and 5). The rollover sensing apparatus 20 further includes a comparator 46 for comparing the predicted future roll angle ϕ_t to a threshold value ϕ_O, and an

output 31 for generating an output signal indicative of an anticipated vehicle overturn condition prediction based on the comparison.

According to yet another aspect of the present invention, as recited in independent claim 18, a method 60 for estimating a future roll angle ϕ_t of a vehicle 10 is provided, which is particularly shown in FIG. 4. The method 60 includes the step of sensing 64 angular acceleration $\ddot{\phi}$ of a vehicle 10 and producing an output signal indicative thereof. The method 60 also includes the step of integrating 76 the sensed angular acceleration signal $\ddot{\phi}$ to generate an angular rate $\dot{\phi}$. The method 60 further includes the steps of obtaining 79 a current roll angle ϕ, and predicting 82 a future roll angle ϕ_t as a function of the sensed angular acceleration $\ddot{\phi}$, the angular rate $\dot{\phi}$, and the current roll angle ϕ.

According to a further aspect of the present invention, a method 60, as recited in independent claim 25, is provided for predicting an overturn condition of a vehicle 10, which is also shown in FIG. 4. The method 60 includes the steps of sensing 64 angular acceleration $\ddot{\phi}$ of a vehicle 10 and producing an output signal indicative thereof. The method 60 also includes the steps of integrating 76 the sensed angular acceleration signal $\ddot{\phi}$ and producing an angular rate $\dot{\phi}$, and obtaining 79 a current roll angle ϕ. The method 60 also includes the step of predicting 82 a future roll angle ϕ_t as a function of the sensed angular acceleration $\ddot{\phi}$, the angular rate $\dot{\phi}$, and the current roll angle ϕ. The method 60 further includes the steps of comparing 84 the predicted future roll angle ϕ_t to a threshold value ϕ_O, and generating 86 a vehicle overturn condition signal based on the comparison.

VI. Grounds of Rejection to Be Reviewed on Appeal

Whether claims 1-31 are unpatentable under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,192,305 to Schiffmann.

VII. Argument

Four groups of claims as defined by the four independent claims are essentially presented for consideration on appeal. Independent claim 1 is directed to a roll angle estimation apparatus for predicting a future roll angle of a vehicle, whereas independent claim 10 is directed to a rollover sensing apparatus for predicting an overturn condition for a vehicle, whereas independent claim 18 is directed to a method for estimating a future roll angle of a vehicle, and whereas independent claim 25 is directed to a method for predicting an overturn condition of a vehicle. As discussed with regard to the arguments below, the claimed invention set forth in each of the four aforementioned independent claims generally recites sensing of angular acceleration of a vehicle, integrating the sensed angular acceleration signal to produce an angular rate, and predicting a future roll angle of the vehicle as a function of the sensed angular acceleration, the angular rate, and a current roll angle. Accordingly, Appellant's arguments as to why all four independent claims and the claims dependent thereon are not anticipated by Schiffmann are addressed together below.

A. Reference(s)

1. **U.S. Patent No. 6,192,305 to Schiffmann**

The Schiffmann patent, which is assigned to the Assignee of the present application, discloses a rollover sensing module 10 for predicting rollover or pitchover conditions of a vehicle. The rollover sensing module 10 disclosed in Schiffmann employs three accelerometers; namely, a lateral accelerometer 14, a longitudinal accelerometer 18 and a vertical accelerometer 20. In addition, the rollover sensing module 10 of Schiffmann employs a roll angular rate sensor 12 and a pitch angular rate sensor 16. Each of the accelerometers 14, 18 and 20 employed in the Schiffmann rollover sensing module 10 are linear accelerometers which sense linear acceleration along a specified axis (e.g., lateral, longitudinal or vertical axis).

The Schiffmann patent discloses, in FIG. 12, a rollover production methodology 270 having step 294 which estimates roll and pitch angular accelerations. Specifically, the Schiffmann patent at column 13, lines 18-23, states that methodology 290 estimates the roll and pitch angular accelerations as provided in block 294. Schiffmann further goes on to state that a

separate, simple Kalman filter may be used to estimate the time-derivatives of the bias-corrected measured roll rate and pitch rate signals to provide the estimated roll and pitch accelerations. Thus, Schiffmann makes clear that the roll and pitch accelerations are estimated by taking the time derivatives of the measured roll and pitch rate signals.

B. Rejection Under 35 U.S.C. §102(b) over U.S. Patent No. 6,192,305 to Schiffmann

Appellant respectfully submits that claims 1-31 are not anticipated by the Schiffmann patent. The Examiner has failed to establish that Schiffmann discloses each and every feature recited in Appellant's independent claims 1, 10, 18 and 25, and therefore has failed to show anticipation as required under 35 U.S.C. §102(b).

Title 35 of the United States Code, §102(b) provides a person shall be entitled to a patent unless the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application of patent in the United States. The requirements for anticipating a claim are described in §2131 of the latest edition of the *Manual of Patent Examining Procedures* (M.P.E.P.) as follows:

> "To anticipate a claim, the reference must teach every element of the claim."
>
> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California* 814 F. 2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987).
>
> "The identical invention must be shown in as complete detail as is contained in the... claim." *Richardson v. Suzuki Motor Co.*, 868 F. 2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).
>
> "The elements must be arranged as required by the claim." *In re Bond*, 910 F.2d 831 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990).

Appellant submits that Schiffmann clearly fails to teach each and every element of each of the independent claims 1, 10, 18 and 25. Specifically, with respect to independent claims 1 and 10, Schiffmann fails to teach a roll angle estimation or rollover sensing apparatus comprising an angular accelerometer for sensing angular acceleration of a vehicle, an integrator for integrating the sensed angular acceleration signal and producing an angular rate signal, and a predictor for predicting a future roll angle of the vehicle as a function of the sensed angular acceleration, the angular rate and a current roll angle. Similarly, with respect to independent claims 18 and 25, Schiffmann fails to teach a method comprising the steps of sensing angular acceleration of a vehicle, integrating the sensed angular acceleration signal to generate an angular rate, and predicting a future roll angle as a function of the sensed angular acceleration, the angular rate and the current roll angle.

Instead, Schiffmann teaches a rollover sensing module that uses linear accelerometers and rate sensors. The linear accelerometers sense linear acceleration, in contrast to angular acceleration. The rate sensors sense roll and pitch rate signals. While the Schiffmann patent estimates roll and pitch angular accelerations in block 294 of methodology 270, Schiffmann does so by estimating the time-derivatives of the bias-corrected measured roll rate and pitch rate signals to provide estimated roll and pitch accelerations. Thus, Schiffmann requires the use of roll rate and pitch rate sensors to sense the roll and pitch rates, as opposed to use of an angular accelerometer and the further processing of the output of such accelerometer by an integrator.

In the Final Office Action, the Examiner, referring to Schiffmann, pointed to integrator 110 shown in FIG. 2A of Schiffmann which receives pitch and roll rate signals along with pitch and roll rate bias signals and provides an integration responsive to roll and pitch angle estimates. The Schiffmann patent derives roll and pitch angles by integrating the sensed roll and pitch rate signals. The sensed roll and pitch rate signals in Schiffmann are sensed by rate sensors and are not derived from sensed angular acceleration signals. The integrator 110 of Schiffmann does not integrate a sensed angular acceleration signal and produce an angular rate. Instead, the integrator 110 receives rate and angle information and outputs updated estimates of current pitch and roll angles. Nowhere does the Schiffmann patent teach sensing

angular acceleration and integrating a sensed angular acceleration signal as recited in Appellant's claims.

It should be appreciated that by employing the angular accelerometer and integrator, the apparatus and method of the present invention enables early decisions to be made with high confidence through increased accuracy of extrapolated vehicle rotation. The present invention employs the angular accelerometer, in contrast to angular rate sensors which tend to be relatively complex and expensive and require differentiation to provide an acceleration value which can be inherently error-prone. Accordingly, the present invention advantageously provides for a reduced cost, less complex, and less error-prone apparatus for estimating roll angle and predicting an anticipated vehicle overturn condition.

Schiffmann clearly fails to teach each and every element or limitation set forth in each of Appellant's independent claims 1, 10, 18 and 25, and Schiffmann therefore fails to anticipate claims 1-31. Thus, the claimed invention set forth in claims 1-31 is not anticipated by Schiffmann, and rejection of claims 1-31 under 35 U.S.C. §102(b) in view of Schiffmann should therefore be reversed.

C. Conclusion

For the reasons set forth above, and as apparent from examining the invention defined by claims 1-31, when properly considering the cited reference to Schiffmann, these claims are not anticipated by Schiffmann and define patentable subject matter. Appellant respectfully requests that the Examiner's rejection of claims 1-31 under 35 U.S.C. §102(b) be reversed, and that the application be passed to issuance forthwith.

Respectfully submitted,

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March 28, 2006
Date

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Appendix of Claims (37 CFR §41.37(c)

1. (original) A roll angle estimation apparatus for predicting a future roll angle of a vehicle, said apparatus comprising:

an angular accelerometer for sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

an integrator for integrating the sensed angular acceleration signal and producing an angular rate; and

a predictor for predicting a future roll angle of the vehicle as a function of the sensed angular acceleration, the angular rate, and a current roll angle.

2. (original) The apparatus as defined in claim 1, wherein the current roll angle is determined by integrating the angular rate.

3. (original) The apparatus as defined in claim 2, wherein the predictor comprises a Taylor series-based predictor for predicting the future roll angle as a quadratic extrapolation.

4. (original) The apparatus as defined in claim 1, wherein the angular accelerometer senses roll angular acceleration about a longitudinal axis of the vehicle, and said predictor predicts the future roll angle about the longitudinal axis.

5. (original) The apparatus as defined in claim 1, wherein said integrator and predictor are performed by a controller.

6. (original) The apparatus as defined in claim 5, wherein said controller further compares the predicted future roll angle to a threshold value and predicts an anticipated vehicle overturn condition based on the comparison.

7. (original) The apparatus as defined in claim 1, wherein the predictor performs a quadratic extrapolation.

8. (original) The apparatus as defined in claim 1, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of rate of change of the acceleration signal.

9. (original) The apparatus as defined in claim 1, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of magnitude of the acceleration signal.

10. (original) A rollover sensing apparatus for predicting an overturn condition for a vehicle, comprising:

an angular accelerometer for sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

an integrator for integrating the sensed angular acceleration signal and producing an angular rate;

a predictor for predicting a future roll angle of the vehicle as a function of the sensed angular acceleration, the angular rate, and a current roll angle;

a comparator for comparing the predicted future roll angle to a threshold value; and

an output for generating an output signal indicative of an anticipated vehicle overturn condition prediction based on said comparison.

11. (original) The apparatus as defined in claim 10, wherein the current roll angle is determined by integrating the angular rate.

12. (original) The apparatus as defined in claim 11, wherein the predictor comprises a Taylor series-based predictor for predicting the future roll angle as a quadratic extrapolation.

13. (original) The apparatus as defined in claim 10, wherein the angular accelerometer senses roll angular acceleration about a longitudinal axis of the vehicle, and said predictor predicts the future roll angle about the longitudinal axis.

14. (original) The apparatus as defined in claim 10, wherein said integrator, predictor, and comparator are performed by a controller.

15. (original) The apparatus as defined in claim 10, wherein the predictor performs a quadratic extrapolation.

16. (original) The apparatus as defined in claim 10, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of rate of change of the acceleration signal.

17. (original) The apparatus as defined in claim 10, wherein the integrator performs a numerical integration of the angular acceleration signal based on time steps that vary as a function of magnitude of the acceleration signal.

18. (original) A method for estimating a future roll angle of a vehicle, said method comprising the steps of:

sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

integrating the sensed angular acceleration signal to generate an angular rate;

obtaining a current roll angle;

predicting a future roll angle as a function of the sensed angular acceleration, the angular rate, and the current roll angle.

19. (original) The method as defined in claim 18, wherein the step of obtaining the current roll angle comprises integrating the angular rate.

20. (original) The method as defined in claim 18 further comprising the steps of:

comparing the predicted future roll angle to a threshold value; and

generating a vehicle overturn condition signal based on said comparison.

21. (original) The method as defined in claim 18, wherein said step of integrating comprises:

determining a rate of change of the acceleration signal;

computing a time step as a function of the rate of change of the acceleration signal; and

performing numerical integration of the acceleration signal based on the computed time step.

22. (original) The method as defined in claim 18, wherein the step of integrating comprises:

determining a magnitude of the acceleration signal;

computing a time step as a function of magnitude of the acceleration signal; and

performing numerical integration of the acceleration signal based on the computed time step.

23. (original) The method as defined in claim 18, wherein the step of sensing angular acceleration comprises sensing roll angular acceleration about a longitudinal axis of the vehicle.

24. (original) The method as defined in claim 18, wherein the step of predicting a future roll angle comprises computing a Taylor-series quadratic function.

25. (original) A method for predicting an overturn condition of a vehicle, said method comprising the steps of:

sensing angular acceleration of a vehicle and producing an output signal indicative thereof;

integrating the sensed angular acceleration signal and producing an angular rate;

obtaining a current roll angle;

predicting a future roll angle as a function of said sensed angular acceleration, said angular rate, and said current roll angle;

comparing the predicted future roll angle to a threshold value; and

generating a vehicle overturn condition signal based on said comparison.

26. (original) The method as defined in claim 25, wherein the step of obtaining the current roll angle comprises integrating the angular rate.

27. (original) The method as defined in claim 25 further comprising the steps of:

comparing the predicted future roll angle to a threshold value; and

deploying a vehicle overturn condition based on said comparison.

28. (original) The method as defined in claim 25, wherein said step of integrating comprises:

determining a rate of change of the acceleration signal;

computing a time step as a function of the rate of change; and

performing numerical integration of the acceleration signal based on the computed time step.

29. (original) The method as defined in claim 25, wherein the step of integrating comprises:

determining a magnitude of the acceleration signal;

computing a time step as a function of magnitude of the acceleration signal; and

performing numerical integration of the acceleration signal based on the computed time step.

30. (original) The method as defined in claim 25, wherein the step of sensing angular acceleration comprises sensing roll angular acceleration about a longitudinal axis of the vehicle.

31. (original) The method as defined in claim 25, wherein the step of predicting a future attitude angle comprises computing a Taylor-series quadratic function.

Evidence Appendix (35 USC §41.37(c))

None.

Related Proceedings Appendix (35 USC §41.37(c))

None.